OI 630.0 nm and N_2 1PG emissions in pulsating aurora events detected by an optical spectrograph at Tromsø, Norway

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Pulsating aurora (PsA) is a diffuse-type aurora, and is characterized by a repetition of brighter (ON) and darker (OFF) auroral emissions with periods of a few to a few tens of seconds. Optical observations for PsAs have been widely performed for many years. One of interesting topics related with PsA would be that there are previous observations indicating OI 630.0 nm pulsations, while the OI 630.0 nm emission, O(1D), has a long radiative lifetime, ~110 s, compared with the PsA periods.

In this work, we performed observations of PsAs with an optical spectrograph at Tromsø, Norway, during wintertime in 2016-2017. The data analysis of multiple PsA events revealed the PsA spectra for the first time. As the results, the OI 630.0 nm emissions as well as the N_2 1PG emissions were found in the both spectra during ON and OFF in the PsA events. The spectra of pulsations were derived as difference spectra between the ON and OFF spectra. From the obtained spectra of pulsations, it is found that dominant pulsations at 630.0 nm were coming from the N_2 1PG (10,7) band, and there were less or minor contributions of the OI 630.0 nm to pulsations at 630.0 nm.